

# 5. LINDA MAR PACIFICA STATE BEACH

City of Pacifica

## VULNERABILITY SUMMARY

Pacifica State Beach (Beach) is **moderately vulnerable** to sea level rise. The Beach, which is a heavily used recreational asset, is directly exposed to higher water levels and wave action from sea level rise, and State Route 1 makes coastal retreat challenging at this location. Most of the Beach would recover from temporary flooding or erosion damage, though the pump stations to the north and south are highly sensitive to flooding. Permanent inundation on site would lead to loss of beach access, loss of the pump stations (and associated spills), and a loss of habitat for the population of the federally threatened snowy plover, which is already limited in the region.

<b>SENSITIVITY</b> Moderate	<b>EXPOSURE</b> Moderate	<b>ADAPTIVE CAPACITY</b> Moderate	<b>CONSEQUENCES</b> Moderate
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## ASSET CHARACTERISTICS

5000 Pacific Coast Hwy | Pacifica

### Asset Description and Function:

The Beach is located on the west side of State Route 1 in the City of Pacifica. This section, from Crespi Drive to San Pedro Creek, is a very popular recreational asset, provides habitat for endangered snowy plovers, and provides water quality and flood protection (for State Route 1) benefits. Two pump stations (Linda Mar for Wastewater and Anza for Stormwater) are on the southern and northern ends of the beach, respectively. The Beach is also the site of the Portola Discovery.



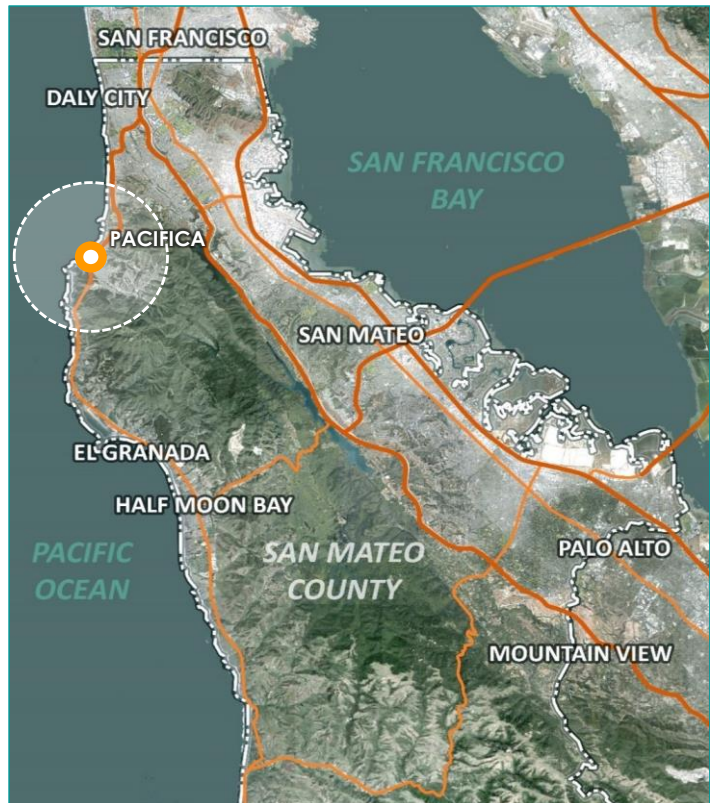
<b>Asset Type</b>	Beach
<b>Asset Risk Class</b>	1, N-Beach
<b>Size</b>	2,000 linear feet
<b>Year of Construction</b>	N/A
<b>Elevation</b>	0 feet (sea level)
<b>Level of Use</b>	1 million visitors/year
<b>Annual O&amp;M Cost</b>	Unknown
<b>Special Flood Hazard Area</b>	Asset is in SFHA
<b>Physical Condition</b>	Fair
<b>Landowner</b>	State of California and City of Pacifica

### Underground Facilities

There are underground stormwater and sewer lines on site. These are not directly associated with the asset and this profile.

### Environmental Considerations

For this asset, the snowy plover, steelhead trout, sandy beach tiger beetle, and beach layia may be present.



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## ASSET SENSITIVITY

The site is moderately sensitive to temporary and permanent inundation, as well as erosion. If the Beach were flooded, it would not be accessible for recreational use until water levels receded. Furthermore, if the pump stations were flooded, they could become inoperable and spill effluent onto the Beach, creating a water quality hazard or leading to longer beach closures. Whether temporary or permanent, inundation and erosion could prevent access to the trails, the parking lot, the pump stations, and the Beach itself. It could also cause the pump stations to lose power, though this has not happened in the past.

From an ecosystem perspective, snowy plover habitat is very sensitive to flooding and sea level rise, as they require dry ground during nesting season. Sea level rise could permanently inundate the Beach, reducing the available habitat, which is limited in this region.

Pacifica State Beach, looking north.



## SHORELINE VULNERABILITY

### Erosion Analysis

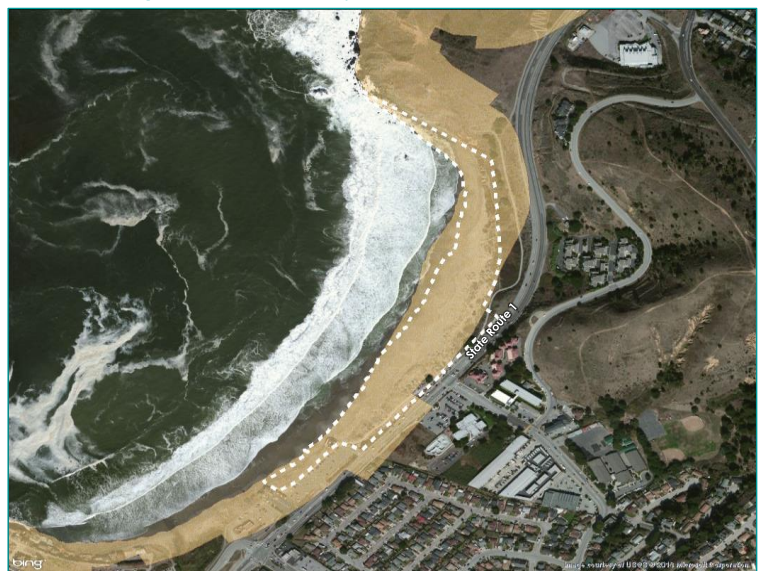
Historical erosion data and projected future erosion (USGS, Pacific Institute) indicate that Pacifica State Beach, and the surrounding area, are particularly at risk from erosion. The asset is located within the area identified by the Pacific Institute study (2012) as susceptible to erosion (eastern extent by 2100 in yellow).

### Cross-Cutting Vulnerabilities

The Beach depends on local sediment supply and coastal processes to balance out the losses of beach area caused by erosion; any reduction in sediment supply will make the Beach increasingly vulnerable to erosion and flooding.

With very severe erosion or high water, State Route 1 could also flood. This could disrupt transportation and egress, and could potentially isolate nearby coastal communities, see Surfer's Beach profile.

Erosion Analysis: Asset is entirely within 2100 erosion zone.



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## SEA LEVEL RISE EXPOSURE ANALYSIS

### Exposure Discussion

The Beach is moderately exposed to sea level rise. The Beach is exposed to regular wave impacts and erosion from high tides and storms, but there is a large body of sand to absorb these impacts, and the Beach has not been fully flooded to date. Under current conditions, the pump stations have never flooded or spilled sewage, and water levels have not overtopped State Route 1.

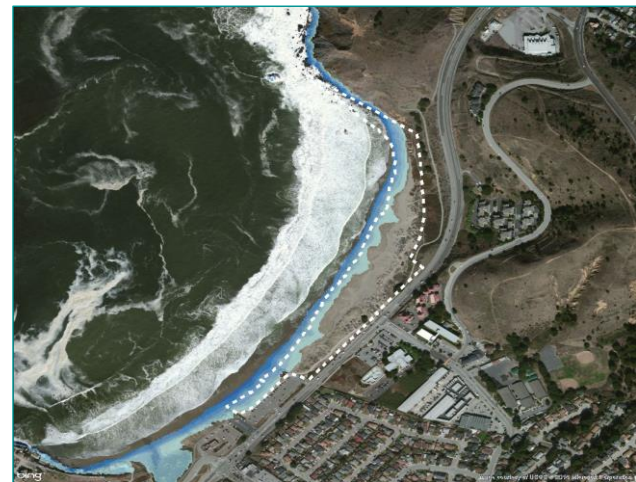
Exposure and erosion are likely to increase in the future with sea level rise. This could expose both pump stations to temporary inoperability (from flooding) or permanent loss of service (from failure, erosion, or wave damage).

With sea level rise or a large storm, the Beach and trail access, the parking area, swathes of snowy plover habitat, and stormwater and pump stations could all be temporarily or permanently flooded. The high-end scenario suggests that State Route 1 may be overtopped by flood water or waves, exposing the properties and people behind it to flooding. Though the bridge at San Pedro Creek was designed for a 1% annual chance flood event, future water level or tidal conditions could reach or exceed the design water level in the creek more frequently. As a result, the creek could overflow during a future 1% annual chance flood event or smaller.

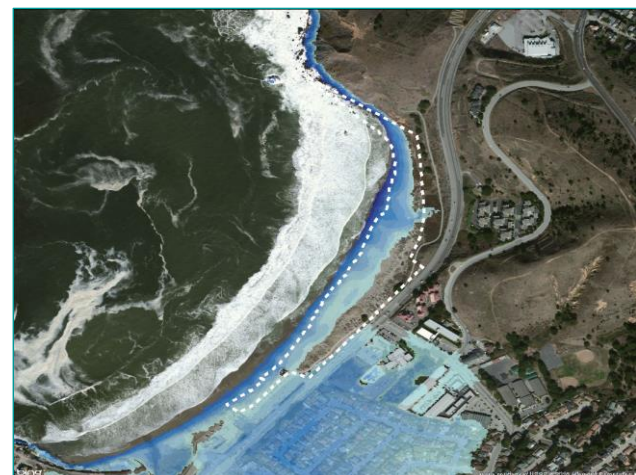
**Baseline Scenario:** Beach is partially flooded.



**Mid-Level Scenario:** Beach and creek flooded.



**High-End Scenario:** Regional inundation.



### Exposure Analysis Results

Potential Inundation Depth (feet)		
Scenario	Minimum	Maximum
First Significant Impacts	<b>Area Not Included in Overtopping Analysis</b>	
Baseline 1% Flood	0	7
Mid-Level 1% + 3.3 feet	0	12
High-End 1% + 6.6 feet	0	15

# LINDA MAR PACIFICA STATE BEACH

## ADAPTIVE CAPACITY, CONSEQUENCES, AND POTENTIAL ADAPTATION

### Adaptive Capacity

Currently, the Beach has moderate adaptive capacity, as flood waters would recede after events have passed, and would likely not create permanent losses or a loss of access to the Beach. However, as sea level rises and as flooding occurs more frequently, the number of days each year when the Beach could be used by native species and visitors would be limited. In particular, snowy plover populations and habitats are already limited in the area, and there are few, if any, alternatives for nesting. The pump stations have emergency plans for high water events, and are relatively adaptable to temporary flooding. They would, however, likely need to be relocated in the long term when the extent of erosion moves far enough east. There are other coastal access opportunities that could likely accommodate the additional visitors if the Beach were closed, though other locations for beginning-level surfers are sparse. Coastal retreat is limited by the presence of State Route 1 at the eastern edge of the Beach, and while the parking lot, trails, and pump station walls could be elevated to adapt to sea level rise, erosion could destroy the Beach or make it less appealing for recreational use.

### Consequences

Consequences of the loss of the Beach are moderate from an economic damage, health, and safety perspective, and the geographic scale of impact would likely be local. Sea level rise and increased erosion could cause permanent loss of this important regional recreational asset, as well as of rare snowy plover habitat. The low-lying State Route 1 and other multipurpose trails could also be interrupted if flooded or damaged by beach erosion. With high enough water levels, State Route 1 could be inundated, and properties behind it would likely flood because they are low-lying and considered protected by the highway. If flooding of the Beach or associated power loss rendered the pump stations inoperable, sewage and stormwater overflow onto the Beach is possible. This could affect water quality near San Pedro Creek, home to threatened steelhead trout; it could also pose risks to human health, and could result in Beach closure. Under severe erosion, properties on the south side of the Beach would also be lost.

### Additional Important Information

Any built adaptation measure that affects the Beach could affect neighborhood flooding south of the Beach, and a strategy would need to be coordinated to protect these communities to ensure they are not adversely affected by adaptation at the Beach.

### Asset-Specific Adaptation

Shoreline retreat is limited by State Route 1, but it has happened in recent years when the parking lot was removed and dunes were restored. The highway and pump stations could be reinforced with floodwalls or riprap, and the snowy plover habitat could be nourished with sand to mitigate erosion temporarily. The trails and parking lot may need to be elevated.

### Vulnerable Beaches

This is the only Asset Vulnerability Profile on vulnerable beaches in the County. The vulnerability assessment analysis shows that there are 123 parks exposed to sea level rise in the near- or long-term; other vulnerable beaches include Half Moon Bay State Beach, Montara State Beach, and Thornton State Beach.

Pump station outlets near the south end of the Beach.



Bridge over San Pedro Creek at the south end of the Beach.

